POSTER SESSION

1014

Clinical Electrophysiology: Supraventricular Arrhythmias

Sunday, March 07, 2004, 9:00 a.m.-11:00 a.m.
Morial Convention Center, Hall G
Presentation Hour: 10:00 a.m.-11:00 a.m.

1014-207 Younger Age at Time of Symptom Onset Is Associated With Nonpulmonary Vein Triggers of Atrial Fibrillation

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Background: Atrial tachycardia (AT) and atrioventricular reentrant tachycardia (AVNRT) are known triggers of atrial fibrillation (AF) and are potential targets for curative ablation. These arrhythmias commonly present before age 35 but may not be recognized until later in life. We sought to determine whether patients with symptoms of atrial fibrillation as young adults referred for treatment of atrial fibrillation had a higher incidence of non-pulmonary vein (PV) triggers.
Methods: Data on 292 patients referred for catheter ablation for treatment of AF (January 1999 – September 2003) was retrospectively analyzed to determine the potential differences in age specific triggers. Data were collected during initial patient interview and included duration of AF symptoms. Electrophysiological studies using multipolar catheters during isoproterenol infusion identified triggers initiating AF as originating from a PV or other atrial source. Non-PV triggers were further characterized as AT or AVNRT and were confirmed by failure to re-initiate AF after successful ablation. Bivariate correlation and multivariable logistic regression were performed to evaluate the association between non-PV triggers of AF and younger age.
Results: Of the 292 patients in the cohort, 46 experienced symptoms attributable to AF before age 35 (mean 28.4 ± 5.5 years). The mean age of these patients at the time of ablation was 37.9 ± 9.1 years vs. 56.0 ± 8.9 years in the rest of the cohort. There were 28 AT and 10 AVNRT triggers of AF in the cohort. After adjustment for sex, left atrial size, mitral regurgitation, history of hypertension, coronary artery disease, congestive heart failure or sleep apnea, younger age at time of symptom onset remained significantly associated with the presence of non-PV triggers (risk ratio: 2.56 (1.2 - 6.2); P=0.03). Younger age was not associated with the presence of AT (P=0.39) but was significantly associated with the presence of AVNRT (P=0.01).
Conclusion: Patients who have experienced symptoms of AF before the age of 35 are more likely to have non-PV triggers initiating AF. Consideration should be given to the presence of AF triggers outside the PVs in patients who have symptoms of AF prior to age 35.

1014-208 Atrial Tachycardia and Atrial Fibrillation Are Closely Linked in Canine Rapid Ventricular Pacing-Induced Cardiomyopathy

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Dogs with rapid ventricular pacing (RVP)-induced congestive heart failure (CHF) have inducible sustained atrial tachycardia (AT) and atrial fibrillation (AF). However, the relationship of AT to AF in experimental CHF is uncertain. We hypothesized that induction of sustained AF is often preceded by AT in this CHF model. ***Methods*** Characteristics and patterns of sustained (>10 min) AF and AT initiation were analyzed in dogs with CHF produced by 3 to 5 weeks of RVP at 240 beats per minute. ***Results*** Among 43 episodes of sustained atrial arrhythmias in 23 CHF dogs: 1) in 10 (23%) episodes in 8 dogs sustained AF was preceded by a transitional rhythm of AT with spontaneous conversion of AT to AF; 2) in 12 (28%) episodes in 8 dogs sustained AF was present for the entire episode duration; and 3) in 21 episodes (49%) in 14 dogs sustained AT was present for the duration. The mean time to spontaneous conversion of AT to AF was 154 sec (range 10-300sec). During 3 (7%) episodes in 2 dogs, AF alternated with AT during an episode. Episodes of AT that spontaneously converted to AF had shorter cycle lengths than those that persisted as AT (139±14 ms vs. 153±15 ms, p=0.038). The duration of RVP among dogs with only AT induced (n=9), only AF induced (n=5), and with AT to AF (n=8) did not differ significantly (3.9±1.1 vs. 4.2±1.1 vs. 4.1±1.1 weeks). Left atrial end-diastolic volume measured by transesophageal echocardiography among dogs with only AT induced, only AF induced, and with AT to AF was not significantly different (43±12 vs. 44±25 vs. 39±5 cc). Right atrial effective refractory period at 400 ms was longer in dogs in which only AF was induced compared with those in which only AT was induced (164±31 vs. 134±19 ms, p=0.055). Verapamil terminated 6 of 7 sustained AT and 4 of 5 sustained AF episodes (AF only or AT to AF). ***Conclusions*** Dogs with RVP induced CHF frequently have both sustained AT and AF induced. A transitional rhythm of AT with spontaneous conversion to sustained AF occurs. Episodes of AT that convert to AF have shorter cycle lengths than those that persist as AT. Verapamil terminates both AT and AF in this CHF model. These observations imply that there is a potential mechanistic link and interaction between AT and AF in CHF.

1014-209 High Risk of Obstructive Sleep Apnea in Patients With Atrial Fibrillation

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Background: Obstructive sleep apnea (OSA) is associated with an increased risk for recurrence of atrial fibrillation (AF) after electrical cardioversion. While OSA is known to be highly prevalent in patients who are male, obese, and/or hypertensive, the prevalence of OSA in patients with AF is unknown.
Methods: We studied 147 patients who were undergoing electrical cardioversion for AF and a gender-matched control group of 210 hypertensive patients. We administered the Berlin questionnaire, a validated screening tool for OSA. The groups were compared in a two-tailed fashion with the student's *t* test, Wilcoxon rank sum test, and Fisher's exact test.
Results: Gender distribution, body-mass index, and neck circumference were similar between groups. The control group was younger (mean age 50 vs. 71 years, p<0.0001). The proportion of patients at high risk for OSA was significantly higher in the AF group compared to hypertensive controls (49% vs. 34%, p=0.006). This was especially true for AF patients with hypertension (n=97, 56%, p=0.0005) and those with hypertension but without diabetes, coronary artery disease, or congestive heart failure (n=53, 51%, p=0.03). In this latter group, the odds of being at high risk for OSA was 2.0 times greater than in the hypertensive controls (95%CI: 1.1 to 3.7).
Conclusion: The novel finding of this study is that the risk of OSA is strikingly high in patients with AF, even higher than in hypertensive patients. Older age in the AF group strengthens these findings, as OSA prevalence usually decreases after age 60 years. These results have important clinical implications, since OSA contributes to an increased risk for recurrence of AF after cardioversion, and treatment of OSA lowers this risk.

1014-210 Coronary Sinus Os and Fossa Ovalis Ablation: Effect on Interatrial Conduction and Inducibility of Atrial Fibrillation

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BACKGROUND: Maintenance of atrial fibrillation (AF) depends, in part, on inter-atrial conduction. The coronary sinus (CS) musculature and fossa ovalis (FO) are important inter-atrial conduction pathways.
HYPOTHESIS: Radiofrequency (RF) energy ablation, using a novel MESH electrode catheter can create circumferential ablation lesions at the CS os, and FO altering inter-atrial conduction and reducing AF inducibility.
METHODS: Under fluoroscopic guidance a multi-polar electrode catheter was placed in the CS of 3 swine. The left atrial (LA) activation sequence (AS) was assessed during low right atrial (LRA) pacing. The right atrial (RA) AS was evaluated with non-contact mapping (Endocardial Solutions) during proximal CS pacing. Using the MESH electrode catheter circumferential RF lesions were delivered just inside the CS os as well as on the right and left atrial (transseptal) aspect of the FO. After each ablation, right and left atrial AS was reassessed. AF inducibility was assessed at baseline and after successful CS os/FO ablation.
RESULTS: At baseline, LA AS was proximal (CS os) to distal and RA activation was earliest at the CS os region in all three animals. AF was inducible with rapid pacing in 2 of 3 swine. CS os ablation resulted in elimination of inter-atrial conduction at the CS level (reversal of LA AS during LRA pacing - distal CS to proximal CS) and a switch of earliest RA activation during proximal CS pacing to the mid septum. FO ablation further shifted RA activation to the high septum (Bachman Bundle). AF was rendered non inducible in 2 of 2 animals.
CONCLUSIONS: In this model, (1) a novel RF energy MESH electrode ablation catheter can create circumferential ablation lesions inside the CS os, and around the FO. (2) These lesions result in conduction block along the CS and the FO and (3) rendered AF non-inducible. (4) Creation of such inter-atrial conduction block may be useful in catheter ablation of AF.

1014-211 Activation Mapping of Pulmonary Veins During Initiation of Atrial Fibrillation Using a Multielectrode Basket Catheter

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Background:It has been suggested that the pulmonary veins (PVs) seem to have the necessary substrate to support reentry as well as focal activity. In an animal study, the complete reentrant loop in the PV has been visualized by optical mapping. However, evidence of reentry has not been demonstrated in humans.
Methods: Thirty-two bipolar electrograms were recorded simultaneously from a basket catheter placed in the PVs in 48 patients with paroxysmal atrial fibrillation (AF). Activation maps of PVs were analyzed from 10 episodes of spontaneous onset of AF and 12 episodes of induced AF by a single extrastimulus from the distal PV. Conduction times from the earliest activation potentials or pacing artifact to each of the potentials were measured. Analysis was based on sequential 100-ms time windows. For each episode, 600 msec of data (6 consecutive time windows) from initiation of the episode was analyzed, and the activation sequences were depicted by activation maps.
Results: During the initiation of AF induced by extrastimulation from the distal PV, a short coupled extrastimulus formed a PV-left atrial (LA) reciprocating reentrant circuit involving exit and entrance breakthrough points at the PV-LA junction. During the spontaneous onset of AF, rapid repetitive firings in a PV induced the partial PV-LA conduction block and a PV-LA reentrant circuit involving the exit and the entrance breakthrough point was